# EXPLANATION OF SIGNIFICANT DIFFERENCES
# REGIONAL GROUNDWATER REMEDIATION PROGRAM
# MIDDLEFIELD-ELLIS-WHISMAN SITE
# MOUNTAIN VIEW, CALIFORNIA
# APRIL 16, 1996



## 1.0 INTRODUCTION

On June 9, 1989, the Record of Decision (ROD) describing the clean up plan for the Middlefield-Ellis-Whisman (MEW) site in Mountain View, California, was signed by the Regional Administrator of the U.S. Environmental Protection Agency (EPA), Region IX. In accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and pursuant to Section 300.435(c)(2)(i), Title 40 of the Code of Federal Regulations [40 CFR 300.435(c)(2)(i)], EPA is required to publish an Explanation of Significant Differences (ESD) when significant, but not fundamental, changes are made to the final remedial action plan described in the ROD.

The purpose of this document is to provide formal interpretation that the remedy, as selected in the ROD on June 9, 1989, includes the use of liquid-phase granular activated carbon (GAC) as a treatment option for extracted groundwater. This document provides a brief background on the MEW Site, provides formal clarification of the groundwater remedy and provides additional rationale for use of liquid-phase GAC as an economical and beneficial treatment technology. EPA is issuing this ESD for clarification purposes. It will not change the ROD, signed June 9, 1989, nor will it change the Explanation of Significant Differences issued in September, 1990.

Intel Corporation (Intel), Raytheon Company (Raytheon), and Fairchild Semiconductor Corporation (Fairchild), in addition to six other companies are responsible for implementing the remedial action plan as described in the ROD.

## 1.1 Statement Regarding the Administrative Record

This ESD will become part of the Administrative Record file (NCP section 300.825 (a)(2)) and the file will be located at:

U.S. Environmental Protection Agency, Region IX
Superfund Records Center
95 Hawthorne Street
San Francisco, CA 94105
Hours: M-F, 8:00 a.m. - 5:00 p.m.

Mountain View Public Library
585 Franklin Street
Mountain View, CA 94041
Hours:
Monday -Thursday, 10:00 a.m. - 9:00 p.m.
Friday & Saturday, 10:00 a.m. - 6:00 p.m.
Sunday, 1:00 p.m. - 5:00 p.m.

## 1.2 Public Participation Activities

EPA has presented this clarification of the remedy in the form of an ESD because it is of a significant, but not fundamental, nature. EPA has provided State regulatory agencies with a comment period for this ESD, and all regulatory agency comments have been incorporated into the text of this ESD. In accordance with Section 117(c) of CERCLA, 42 U.S.C. Section 9617 (c), EPA will publish a notice in the local newspaper, which describes this ESD and its availability for public review at the EPA records center and the Mountain View Public Library.

# 2.0 BACKGROUND

## 2.1 Site Name and Location

The MEW Site is located in Santa Clara County in the City of Mountain View, California. The MEW Site is divided into a Local Study Area (LSA) and a Regional Study Area (RSA). Figure 1-1 identifies the LSA and RSA, along with local roads and landmarks. The LSA consists of National Priority List (NPL) sites: Intel Corporation (Intel), Raytheon Company (Raytheon), and Fairchild Semiconductor Corporation (Fairchild); and six other companies which are non-NPL sites. The LSA encompasses about ½ square mile of the RSA and contains primarily light industrial and commercial areas, with some residential areas west of Whisman Road. The RSA encompasses approximately 8 square miles and includes Moffett Federal Air Field and the National Aeronautics and Space Administration (NASA) Ames Research Center, along with light industrial, commercial, agricultural, residential, recreational, and municipal land uses.

Various owners or occupants in the area around the intersection of Middlefield Road, Ellis Street, Whisman Road, and U.S. Highway 101, are or were involved in the manufacture of semiconductors, metal finishing operations, parts cleaning, aircraft maintenance, and other activities requiring the use of a variety of chemicals. Local facilities with current occupants are presented in Figure 1-2. Site investigations at several of these facilities have revealed the presence of toxic substances in the subsurface soils and the groundwater.

## 2.2 Identification of Lead and Support Agencies

Since May 1985, EPA has been the lead agency at the MEW Site. The California Regional Water Quality Control Board - San Francisco Bay Region (RWQCB) and the California State Department of Toxic Substances Control (DTSC) are the support agencies for the MEW Site.

## 2.3 Site History

During 1981 and 1982, preliminary investigations of facilities within the LSA found concentrations of chemicals in the soil and ground water. By 1984, the Fairchild, Intel, and Raytheon sites were proposed for inclusion on the federal National Priorities List. In 1985, under the direction of the RWQCB, five companies: Fairchild, Intel, Raytheon, NEC Electronics, Inc. (NEC), and Siltec Corporation (Siltec) initiated a joint investigation to document and characterize the distribution of chemicals emanating from their facilities. In April 1985, the RWQCB adopted Waste Discharge Requirements for each of the five companies.

On August 15, 1985, Fairchild, Intel, and Raytheon entered into an Administrative Consent Order with EPA, the RWQCB, and DTSC's predecessor agency, the California Department of Health Services. Under the terms of the Consent Order, the three companies conducted a remedial investigation and feasibility study (RI/FS) for the MEW site. During site investigations, the companies also conducted interim cleanup activities at the MEW Site. These interim cleanup actions included tank removals, soil removal and treatment, well sealing, construction of soil-bentonite cutoff walls, and treatment of groundwater from several extraction wells. By June 1986, Intel, Fairchild and Raytheon were listed on the NPL.

Three major classes of chemicals were investigated during the remedial investigation: volatile organic compounds, semi-volatiles and priority pollutant metals. Investigations at the MEW site revealed the presence of over 70 chemical compounds in the groundwater, surface water and subsurface soils. The vast majority of these compounds were found in the subsurface soils and groundwater. The primary chemicals of concern found at the site were trichloroethene (TCE), chloroform, 1,2 dichlorobenzene, 1,1 dichloroethane, 1,1 dichloroethene, 1,2 dichloroethene, freon-113, phenol, tetrachloroethene, 1,1,1-trichloroethane, and vinyl chloride.

The Remedial Investigation was concluded in July 1988. A draft Feasibility Study and EPA's Proposed Plan were presented to the community for a 60-day review period beginning in November 1988. EPA signed the ROD for the MEW Site on June 9, 1989.

## 2.4 Remedy Selected in the ROD for Ground Water Remediation

The selected groundwater remedy specified in the ROD is groundwater extraction and treatment, with extracted groundwater to be treated using air stripping towers meeting all Bay Area Air Quality Management District (BAAQMD) emission standards. The ROD anticipates that vapor phase granular activated carbon (GAC) for the air stripper's emissions may be required to meet BAAQMD emission standards. Section 13, paragraph 6, of the ROD acknowledges the existence of a liquid-phase GAC groundwater treatment system at the Intel Site and allows for its continued use. The extracted groundwater is required to be reused to the maximum extent possible, with a goal of 100 percent reuse. Extracted groundwater that cannot be reused will be discharged to Stevens Creek pursuant to permits issued in accordance with the National Pollutant Discharge Elimination System (NPDES) established by the Clean Water Act, or to the Mountain View sanitary sewer system under an Industrial Waste Water Discharge Permit issued by the City of Mountain View.

Although several chemicals have been detected in the soil and groundwater at the MEW Site, TCE is the predominant chemical. Therefore, TCE is used as the primary indicator of the size and extent of the chemical plume in ground water. The ratio of the TCE to the other chemicals found in the MEW Site is high enough that when TCE is reduced to the cleanup levels, the other chemicals found at the MEW Site should be reduced to concentrations that meet applicable or relevant and appropriate requirements (ARARs) and do not exceed the maximum cumulative risk levels. However, as the September 1990 ESD explains, the ratios of chemicals may change over time at the site, therefore the site clean up must remediate all chemicals of concern to their respective ARARs.

In the ROD, EPA specified groundwater cleanup standards of 0.005 milligrams per liter (mg/l) of TCE for the shallow aquifers and 0.0008 mg/l TCE for the deep aquifers. The shallow aquifer cleanup standards also apply to the aquifers inside slurry wall contained areas.

## 3.0 EXPLANATION OF SIGNIFICANT DIFFERENCES

This ESD clarifies one part of the remedy described in the ROD. To the extent that this ESD differs from the ROD, it supersedes the ROD signed by the Regional Administrator of EPA in July, 1989. In accordance with the ROD, the selected technology for the primary treatment of extracted groundwater at the MEW Site is air stripping. Section 13, paragraph 6, of the ROD approves the use of existing liquid-phase GAC units at operating systems, such as Intel's groundwater treatment system.

This ESD documents EPA's formal interpretation of the ROD language, allowing the use of liquid-phase GAC for treatment of extracted groundwater throughout the MEW site. This formal interpretation and clarification allows liquid-phase GAC units to be used at new treatment systems, as well as at existing systems.

The following text describes the use of liquid-phase GAC for the primary treatment of a portion of extracted ground water containing volatile organic compounds (VOCs) and air stripping for the remaining extracted groundwater for the Regional Groundwater Remediation Program (RGRP).

During the remedial design process for the RGRP, it was determined that the most technically efficient and economical method of treating the regional extracted groundwater was to segregate the flow and have two parallel treatment systems based on the estimates of groundwater concentrations and flow rates.

The first groundwater treatment system will use a low-profile air stripper to treat extracted groundwater from regional recovery wells having low chemical concentrations. The mass of VOCs from the low concentration wells is estimated to be below current BAAQMD air emission requirements. Emissions from the low-profile air stripper were calculated using the GEP/ISCLT air emissions modeling package to be below the maximum acceptable level of $1 \times 10^{-6}$ specified by BAAQMD.

The second groundwater treatment system will use three liquid-phase GAC vessels to operate in series to treat extracted groundwater from regional recovery wells having high chemical concentrations. The mass of VOCs from the high concentration wells is estimated to be above current BAAQMD air emission requirements and would require Best Available Control Technology for vapor abatement (i.e., vapor phase GAC) if an air stripper were used. The use of liquid-phase GAC for the treatment of extracted groundwater is not subject to BAAQMD requirements because of the absence of air emissions. To optimize carbon utilization, long contact time and additional carbon beds in series are typical design considerations. The final design will incorporate three beds in series. Each of the beds will contain 10,000 pounds of GAC to allow adequate contact time for adsorption to occur.

The system design parameters used for the GAC system are the influent groundwater concentrations, flow rate, and effluent requirements. The projected influent chemical concentrations and flow rate are based on historical ground water concentrations measured in existing wells in the proximity of proposed regional recovery wells. Effluent requirements were set based on the Federal and California primary and secondary drinking water Maximum Contaminant Levels (MCLs), ARARs presented in the ROD and existing NPDES permits for other groundwater treatment systems at the MEW Site. Groundwater discharge from the system will still meet the effluent limitations required by the NPDES permit. Intel has been utilizing liquid-phase GAC as the primary treatment system for extracted groundwater on the MEW site since before the ROD was signed in 1989. Intel's groundwater remediation program, utilizing liquid-phase GAC treatment technology has successfully removed all chemicals of concern, including vinyl chloride, to NPDES discharge standards.

The basis of design for the RGRP groundwater treatment systems is contained in Appendix F of the Final Design of the RGRP south of U.S. Highway 101 submitted to EPA on January 8, 1996. Table 1 provides an order-of-magnitude estimate to construct and operate two parallel treatment systems (GAC and air stripping) for flows having low and high chemical concentrations. Table 2 provides an order-of-magnitude estimate to construct and operate an air stripper to treat all of the extracted water.

There are several additional advantages to segregating the low concentration and high concentration flows and using two parallel treatment systems:

- **Flexibility.** Liquid-phase carbon can treat a wide-range of influent concentrations without requiring system adjustment. If concentrations decrease, the changeout frequency may decrease, and vice versa. The main advantage to this is that cost savings are realized immediately with reductions in concentration. By comparison, air stripping accrues the same costs for operating the blower and dehumidifier regardless of concentration.

- **Reliability.** GAC systems involve no electrical equipment or electronic instrumentation, and therefore are much more reliable than other systems. The technology is well proven and readily available from several reliable sources.

- **Design Simplicity.** A multi-vessel carbon system is simple to design because it requires minimal peripheral equipment. An air stripper with off-gas treatment, for example, would require a dehumidifier to achieve its maximum efficiency. Without the additional air emission treatment, equipment, piping and instrumentation are less complex and, thus, easier to design and operate.

- **Reusable Effluent.** Effluent from a GAC system will be ready for reuse immediately. Treated water from an air stripper may need additional post-treatment for various reuse alternatives. Air stripper effluent contains anti-scalant additives and may contain products of incomplete degradation, both of which may require additional treatment prior to reuse.

- **Nonhazardous Waste Disposal.** The used liquid-phase carbon can likely be disposed of in nonhazardous waste landfills or be regenerated at a non-hazardous regeneration facility. It is also estimated that providing an air stripper for the low concentration wells will reduce the total granular activated carbon requiring disposal.

## 4.0 AFFIRMATION OF STATUTORY DETERMINATIONS

Considering the need for clarity with respect to the treatment technologies identified in the ROD, EPA has issued this ESD to provide formal interpretation of what treatment technologies are to be used as part of the groundwater remedy. The remedy has not changed, and EPA and the support agencies believe that the remedy remains protective of human health and the environment, complies with federal and state requirements that were identified in the MEW groundwater ROD as the Applicable or Relevant and Appropriate Requirements to this remedial action at the time the original ROD was signed, and is cost-effective. In addition, the remedy continues to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

Keith A. Takata — April 16, 1996

Keith A. Takata — Date
Director
Superfund Division